

PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventors: JOHN GILBERT COOPER, BENJAMIN PERCY GLEDHILL and
WILLIAM HOUSTON MITCHELL

1017,464



1017,464

Date of filing Complete Specification Dec. 5, 1962.

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COMPLETE SPECIFICATION

Improvements in or relating to Pneumatic Tyres and to Methods of their Manufacture

ERRATA

SPECIFICATION No. 1,017,464
Amendment No. 1

Page 1, line 15, after "said" delete "said"
(second occurrence)

Page 3, line 25, for "overlapping" read
"overlying"

Page 5, line 33, for "3" read "2"

THE PATENT OFFICE
10th February 1966

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coloured rubber, moulding and vacuuming the tyre and removing part of the capping layer to expose at least some of the relatively lighter coloured rubber.

Preferably the differently coloured portions of the main layer and the capping layer are positioned separately on a sidewall of the tyre carcass, but a pre-assembled strip of rubber may be applied as a whole, this pre-assembled strip being either a complete or part sidewall assembly. A conventional sidewall rubber strip may be applied to the other sidewall region.

Preferably also a tread rubber strip is applied to the tyre carcass before the sidewall layers are applied to a sidewall portion thereof and the or one of the dark coloured portions of the main layer overlaps and is in con-

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tyre constructed in accordance with a yet further embodiment of the invention, and

Figure 7 is a view of part of a pneumatic tyre which is a modification of the tyre shown in Figure 6.

In the method of constructing the pneumatic tyre of which part is shown in Figure 1, the carcass 1 of a pneumatic tyre, comprising at least one ply of rubberised parallel cord fabric and a pair of bead wires, is built in a substantially cylindrical condition upon a tyre building former and a tread strip 2 is applied to the carcass symmetrically about the mid-circumferential plane of the former, in a conventional manner.

In one sidewall region of the tyre a strip 3 of black rubber having a tapered edge is located upon the carcass at a pre-determined

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Improvements in or relating to Pneumatic Tyres and to Methods of their Manufacture

- We, DUNLOP RUBBER COMPANY LIMITED, a British Company of 1 Albany Street, London, N.W.1., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- This invention relates to pneumatic tyres and to methods of their manufacture.
- According to the invention a method of manufacturing a pneumatic tyre comprises positioning a main layer and a capping layer of rubber around a sidewall region of the carcass of a tyre, at least one portion of the said main layer being formed from dark coloured rubber and at least one other portion being formed from relatively lighter coloured rubber, and the said capping layer being formed from dark coloured rubber and overlying the whole of the portion or portions of the main layer of relatively lighter coloured rubber, moulding and vulcanising the tyre and removing part of the capping layer to expose at least some of the relatively lighter coloured rubber.
- Preferably the differently coloured portions of the main layer and the capping layer are positioned separately on a sidewall of the tyre carcass, but a pre-assembled strip of rubber may be applied as a whole, this pre-assembled strip being either a complete or part sidewall assembly. A conventional sidewall rubber strip may be applied to the other sidewall region.
- Preferably also a tread rubber strip is applied to the tyre carcass before the sidewall layers are applied to a sidewall portion thereof and the or one of the dark coloured portions of the main layer overlaps and is in contact with an edge portion of the tread rubber strip.
- Various embodiments of the invention and modifications thereof will now be described with reference to the accompanying cross-sectional diagrammatic drawings, in which:—
- Figure 1 is a view of part of a pneumatic tyre constructed in accordance with a preferred embodiment of the invention,
- Figure 2 is a view of part of a pneumatic tyre which is a modification of the tyre shown in Figure 1,
- Figure 3 is a view of part of a pneumatic tyre constructed in accordance with a further embodiment of the invention,
- Figure 4 is a view of part of a pneumatic tyre constructed in accordance with a still further embodiment of the invention,
- Figure 5 is a view of part of a pneumatic tyre which is a modification of the tyre shown in Figure 4,
- Figure 6 is a view of part of a pneumatic tyre constructed in accordance with a yet further embodiment of the invention, and
- Figure 7 is a view of part of a pneumatic tyre which is a modification of the tyre shown in Figure 6.
- In the method of constructing the pneumatic tyre of which part is shown in Figure 1, the carcass 1 of a pneumatic tyre, comprising at least one ply of rubberised parallel cord fabric and a pair of bead wires, is built in a substantially cylindrical condition upon a tyre building former and a tread strip 2 is applied to the carcass symmetrically about the mid-circumferential plane of the former, in a conventional manner.
- In one sidewall region of the tyre a strip 3 of black rubber having a tapered edge is located upon the carcass at a pre-determined

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distance from the mid-circumferential plane of the former to form a portion of the main layer of sidewall rubber, the strip 3 being in contact with the carcass 1 and overlying an edge portion 4 of the tread strip 2.

A strip 5 of white rubber having tapered edges is then located upon the carcass to form the other portion of the main layer of sidewall rubber at an axially outward position of the strip 3, one tapered edge overlying the tapered edge of the strip 3 and the other edge extending to and terminating at the bead region 6 of the carcass. A relatively thin capping layer 7 of non-staining black rubber, e.g. the synthetic rubber known as neoprene rubber, is applied to the main layer of sidewall rubber so that it covers all of the white strip 5 and its edges terminate respectively on the bead region 6 of the carcass 1 and on the black rubber strip 3. A portion of the capping layer is shown by broken lines in Figure 1 since it is eventually buffed off as later described. A further thin layer 8 of neoprene rubber is located on the sidewall rubber so that it covers the edge of the capping layer 7 lying on the black rubber strip 3.

A strip of black sidewall rubber is applied to the other sidewall of the carcass in a conventional manner, and the completed carcass is removed from the former, is expanded into a toroidal condition, placed within a mould then moulded and vulcanised. During moulding, the sidewall portions and tread portion of the tyre are given the required external contour.

After vulcanisation, the tyre is removed from the mould and an annular portion of the capping layer 7 below the mid-sidewall position is buffed or ground down to expose an annular portion of the white rubber strip 5, as shown in Figure 1, and to provide a shallow annular depression extending around a sidewall of the tyre, the base of which is formed by the white strip 5.

The method of constructing the pneumatic tyre of which part is shown in Figure 2 is substantially the same as that for the tyre of which part is shown in Figure 1. However, the white strip 5a is positioned on the carcass 1 in its substantially cylindrical condition on a tyre building former before the black strip 3a, the axially inner edge of the strip 3a abutting the edge portion 4 of the tread strip 2. The black strip is then located on the sidewall region so as to lie on the edge portion 4 and to abut the adjacent edge of the strip 5a. An additional difference is that no additional strip 8 is provided. As before, the tyre carcass is completed by the addition of a black rubber sidewall strip to the other sidewall, removed from the former, shaped moulded and vulcanised, and then after removal from the mould, part of the capping layer 7a is buffed or ground away

to expose an annular portion of the white strip 5a.

The method of manufacturing the pneumatic tyre of which part is shown in Figure 3 is substantially the same as that for the tyre of which part is shown in Figure 2. In this embodiment, however, chafer strips 9 of black rubber are located on the substantially cylindrical partially built carcass so as to surround the bead regions of the carcass, the chafer strip adjacent the white rubber strip 5b overlapping the edge thereof. The capping layer 7b of black neoprene rubber is then placed in position extending across the white rubber strip 5b, overlapping onto the black rubber strip 3b and the adjacent chafing strip 9.

The tyre carcass is then completed by the addition of a conventional black rubber strip on the other sidewall, is removed from the former, is expanded into a toroidal condition, and placed within a mould where it is moulded and vulcanised. During moulding, however, the white and black rubber main layer and capping strip 7 are profiled to form two concentric annular ribs, as shown in Figure 3. The radially inner of the two ribs is formed from the white rubber strip 5 covered by the capping strip 7, and the radially outer rib is formed on the black rubber strip 3 and an edge of the capping strip 7. During moulding also, the radially inner rib is provided with a surface 7c of concave shape (when viewed in transverse cross-section of the tyre).

After removal from the mould, the non-staining rubber forming the concave surface is buffed or ground away to expose an annular portion of white rubber, the buffing or grinding operation being continued to provide the rib with a flat substantially radially-extending face as shown along the dashed line in Figure 3.

The object of providing a concave surface on the rib is to ensure that a clear line of demarcation is provided between black and white rubbers after buffing or grinding.

In the finished tyre, the radially outer black rib extends axially outwardly of the white rib so as to afford some protection to the latter in the event of the sidewall rubbing against, for example, a kerbstone, during normal use.

A satisfactory line of demarcation is also obtained after buffing when, in an alternative moulding operation, the radially inner rib is provided with a flat radial surface instead of a concave surface as described above.

In the method of constructing the pneumatic tyre of which part is shown in Figure 4, a tyre carcass 1 and tread strip 2 are assembled upon a substantially cylindrical tyre building former as mentioned in the description of the preferred embodiment of the invention.

A white rubber strip 10 is applied to a sidewall region of the carcass 1 at a predetermined distance from the mid-circumferential plane of the former and out of contact with an edge portion of the tread strip to form part of a main layer of sidewall rubber. A guide wheel, rotatably mounted at a pre-set distance from the said plane about an axis parallel to the axis of the former and running freely upon the carcass, is used to guide the strip into its correct position upon the carcass 1 on the former. A relatively thin layer 11 of black non-staining rubber, e.g. neoprene, is superposed upon the white strip 10 so as to completely cover it (see dotted lines in Figure 4). The main layer of rubber is then completed by applying two strips 12 and 13 of black rubber to the carcass 1, the strips 12 and 13 being disposed one on each side of, and overlapping the edges of, the white strip 10, and being separated therefrom by the non-staining strip 11. The edges of the strips 10, 12 and 13 are tapered, the edges of the strips 12 and 13 adjacent the white strip 10 overlapping the edges thereof and the other edges of the strips 12 and 13 overlying the edge portion 4 of the tread strip and terminating in the bead region 6 of the carcass 1 respectively.

The other sidewall region of the carcass is provided with a black rubber sidewall strip in a conventional manner, and the completed carcass is removed from the former, expanded into a toroidal condition, placed within a mould, and moulded and vulcanised. During moulding, the portion of the sidewall occupied by the white strip 10 and the non-staining overlying capping layer 11 is formed into an annular rib.

After vulcanisation, the tyre is removed from the mould and a central annular portion of the capping layer 11 is buffed or ground down to expose an annular portion of white rubber upon the rib, the unbuffed portions of the capping layer 11 forming two concentric annular rib edge portions disposed one on each side of the exposed white rubber.

Alternatively, as shown in Figure 5, the portion 11a of the capping layer 11 overlying the white rubber strip 10 is completely buffed or ground away resulting in a white coloured sidewall rib devoid of the concentric annular rib edge portions described above.

In the construction of the pneumatic tyre of which part is shown in Figure 6, a tyre carcass 1 and tread strip 2 are assembled upon a substantially cylindrical tyre building former.

A black rubber strip 14 having tapered edges is positioned on an edge portion 4 of the tread strip 2 and overlaps onto the carcass 1 to form part of a main layer of sidewall rubber. The main layer further com-

prises two strips 15 and 16 of black non-staining neoprene rubber, strip 15 lying on the axially outer edge of the rubber strip 14 and overlapping on to the carcass 1, and strip 16 lying on the carcass 1 and extending from the adjacent bead region 6 axially inwardly thereof. The remote edges of the neoprene strips 15 and 16 taper gradually, but the confronting edges are substantially "square", and the space therebetween is filled by the application of a strip 17 of white rubber. Thus the main layer of sidewall rubber consists of the strips 14, 15, and 16 together with the strip 17.

A relatively thin capping layer 18 of non-staining neoprene rubber is then applied to the sidewall rubber extending between and overlapping the edges of the strips 15 and 16 and completely covering the white rubber strip 17.

The tyre carcass is completed by the addition of a conventional black rubber sidewall strip to the other sidewall region, is removed from the former, expanded into toroidal condition, placed within a mould and moulded and vulcanised. After vulcanisation the tyre is removed from the mould and an annular portion of the neoprene rubber strip 18 is buffed or ground away to expose an annular portion of the white rubber strip 17, the white rubber constituting the base of a shallow annular depression around the sidewall region of the tyre as shown in Figure 6.

In a modification of the method of constructing the pneumatic tyre described with reference to Figure 6, Figure 7 shows part of a pneumatic tyre in which the neoprene strips 15 and 16 form part of a single profiled strip 19 of neoprene. A strip of white rubber 20 is applied to the strip 19 to fill a depression 19a formed on the strip 19. A relatively thin strip 18 of non-staining neoprene rubber is applied to the sidewall rubber as before so that it completely covers the white rubber strip 20. Thus the white rubber strip is completely surrounded by non-staining neoprene rubber.

The tyre carcass is then completed, removed from the former, shaped, moulded, vulcanised and ground or buffed as in the method of construction of the tyre described with reference to Figure 6.

In the construction of pneumatic tyres according to any of the embodiments of the invention or modifications thereof, the buffing or grinding operations may be modified to expose a plurality of concentric annular portions of white rubber. In addition, the sidewall rubbers may be partially or completely preassembled before assembly to the tyre carcass 1 and tread strip 2, and the layers of neoprene rubber may, alternatively, be formed from any other non-staining rubber.

WHAT WE CLAIM IS:—

1. A method of manufacturing a pneumatic tyre comprising positioning a main layer and a capping layer of rubber around a sidewall region of the carcass of a tyre, at least one portion of the said main layer being formed from dark coloured rubber and at least one other portion being formed from relatively lighter coloured rubber, and the said capping layer being formed from dark coloured rubber and overlying the whole of the portion or portions of the main layer of relatively lighter coloured rubber, moulding and vulcanising the tyre, and removing part of the capping layer to expose at least some of the relatively lighter coloured rubber. 70
2. A method of manufacturing a pneumatic tyre according to claim 1 wherein the portions of the main layer and the capping layer are positioned separately on a sidewall of a tyre carcass. 75
3. A method of manufacturing a pneumatic tyre according to claim 1 wherein some at least of the portions of the main layer and the capping layer are preassembled and applied to the tyre carcass as a whole. 80
4. A method of manufacturing a pneumatic tyre according to any of the preceding claims wherein a tread rubber strip is applied to the tyre carcass before the sidewall layers are applied to a sidewall portion thereof, and the or one of the dark coloured portions of the main layer overlaps and is in contact with an edge portion of the said tread rubber strip. 85
5. A method of manufacturing a pneumatic tyre according to any of the preceding claims wherein the capping layer is of dark coloured non-staining rubber. 90
6. A method of manufacturing a pneumatic tyre according to either claim 4 or 5 wherein a single relatively lighter coloured portion of the main layer is positioned on a sidewall region of the carcass of a tyre, the said portion having tapered edges and extending from the corresponding bead region of the tyre to the dark coloured portion of the main layer which portion overlaps and is in contact with an edge portion of the tread rubber strip. 95
7. A method of manufacturing a pneumatic tyre according to either claim 5 or 6 wherein an additional strip of non-staining rubber is positioned on a sidewall region of the carcass of a tyre to cover the edge of the capping layer of non-staining rubber in contact with and overlapping onto the darker coloured portion of the main layer. 100
8. A method of manufacturing a pneumatic tyre according to either claim 5 or 6 wherein one edge of the relatively lighter coloured portion of the main layer is overlapped by an edge of the dark coloured portion of the main layer and the other edge of the lighter coloured portion is overlapped by an edge of a chafer strip extending around the bead region of the tyre, and wherein the capping layer extends over the lighter coloured portion and overlaps the edges of the dark coloured portion of the main layer and of the chafer strip which are adjacent to the lighter coloured portion. 105
9. A method of manufacturing a pneumatic tyre according to claim 8 wherein the sidewall region of the tyre is provided with the capping and main layers is profiled, during moulding, to form two annular concentric ribs, the radially inner rib consisting of relatively lighter coloured rubber covered by the capping layer. 110
10. A method of manufacturing a pneumatic tyre according to either claim 4 or 5 wherein a sidewall region of the tyre is provided with a strip of relatively lighter coloured rubber, a capping strip of non-staining rubber being provided to substantially cover the exposed portions of the strip of relatively lighter coloured rubber, strips of dark coloured rubber being provided on the sidewall region of the tyre on either side of and overlapping the edges of the strip of light coloured rubber but being substantially separated therefrom by the capping layer. 115
11. A method of manufacturing a pneumatic tyre according to claim 10 wherein the sidewall region of the tyre provided with main and capping layers is provided, during moulding, with an annular concentric rib consisting of relatively lighter coloured rubber covered by the capping layer. 120
12. A method of manufacturing a pneumatic tyre according to either claim 4 or 5 wherein a sidewall region of the tyre is provided with a main layer consisting of a dark coloured portion overlying an edge portion of a rubber tread strip, two strips of dark non-staining rubber, one of which overlies the radially inner edge of the dark coloured portion and the other of which extends from the corresponding bead region of the tyre towards the first strip of dark non-staining rubber, and a relatively lighter coloured strip of rubber extending between the said two strips of dark non-staining rubber. 125
13. A method of manufacturing a pneumatic tyre according to claim 12 wherein the two strips of dark non-staining rubber form part of a single profiled strip of dark non-staining rubber formed with a central depression, and the strip of relatively lighter coloured rubber is applied to the single strip and fills the depression formed therein. 130
14. A method of manufacturing a pneumatic tyre according to any of the preceding claims wherein an annular portion of the capping layer is buffed or ground away to expose an annular portion of the relatively lighter coloured rubber.
15. A method of manufacturing a pneumatic tyre according to any of claims

- 1—13 wherein a plurality of concentric annular portions of the capping layer are buffed or ground away to expose a plurality of concentric annular portions of relatively lighter coloured material.
16. A method of manufacturing a pneumatic tyre according to any of the preceding claims wherein the dark coloured rubber and the relatively lighter coloured rubber are black and white respectively.
17. A method of manufacturing a pneumatic tyre according to claim 5 or any of claims 6 to 16 when appendant to claim 5 wherein the dark non-staining rubber is the synthetic rubber known as neoprene.
18. A method of manufacturing a pneumatic tyre according to any of the preceding claims wherein the main and capping layers are applied to a tyre carcass in a substantially cylindrical condition upon a tyre former, the carcass is subsequently completed by the addition of a black rubber sidewall strip to the other sidewall and is then removed from the former, expanded and placed within a mould to be moulded and vulcanised.
19. A method of manufacturing a pneumatic tyre substantially as described herein with reference to Figure 1 of the accompanying drawings.
20. A method of manufacturing a pneumatic tyre substantially as described herein with reference to Figure 3 of the accompanying drawings.
21. A method of manufacturing a pneumatic tyre substantially as described herein with reference to Figure 3 of the accompanying drawings.
22. A method of manufacturing a pneumatic tyre substantially as described herein with reference to Figure 4 of the accompanying drawings.
23. A method of manufacturing a pneumatic tyre substantially as described herein with reference to Figure 5 of the accompanying drawings.
24. A method of manufacturing a pneumatic tyre substantially as described herein with reference to Figure 6 of the accompanying drawings.
25. A method of manufacturing a pneumatic tyre substantially as described herein with reference to Figure 7 of the accompanying drawings.
26. A pneumatic tyre in the manufacture of which a method according to any of the preceding claims has been used.

C. H. BOWYER,
Agent for the Applicants.

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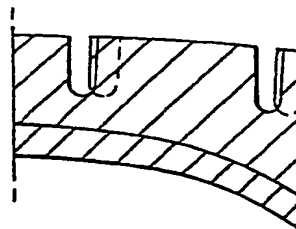


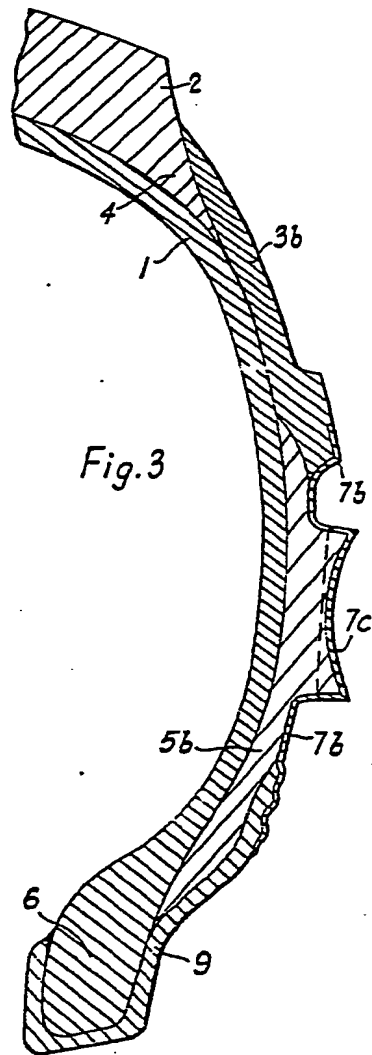
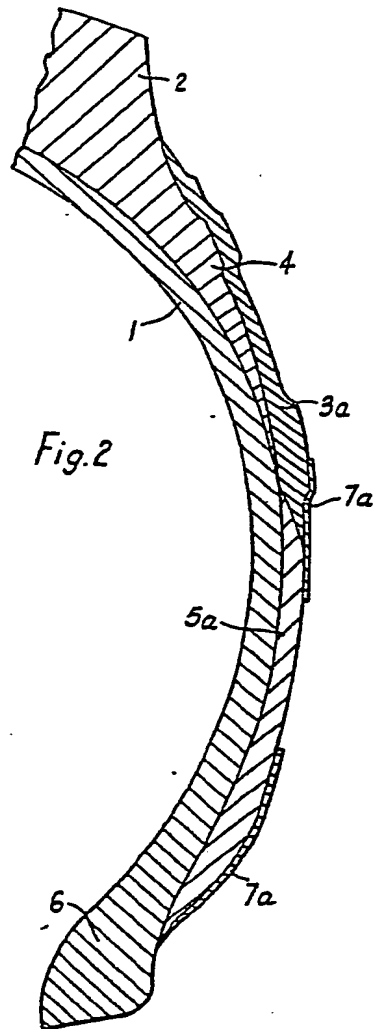
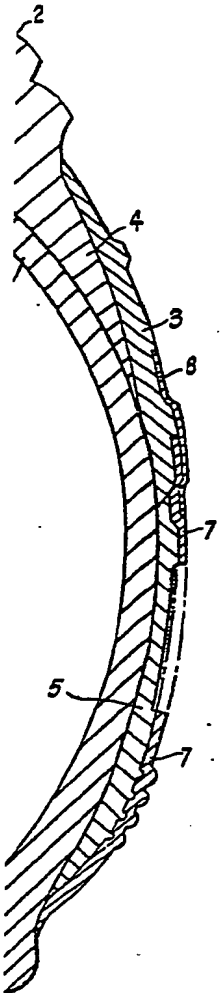
Fig. 1

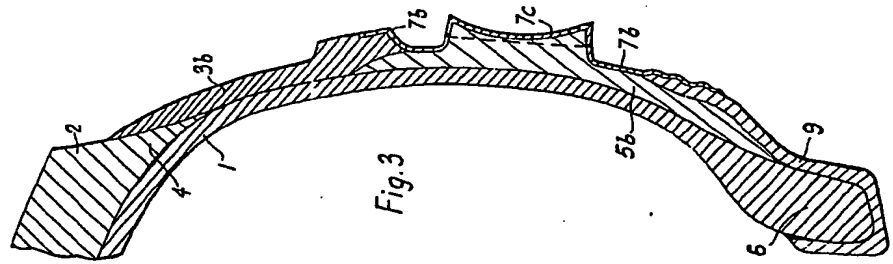
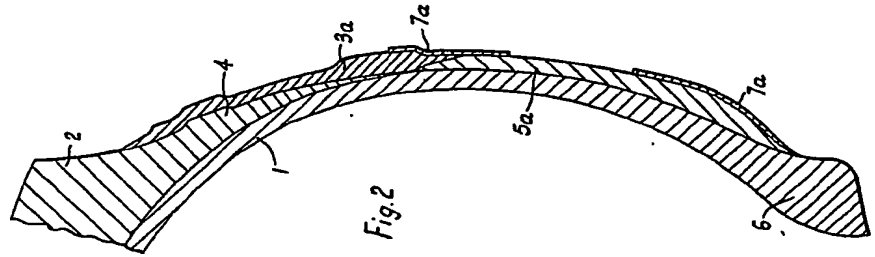
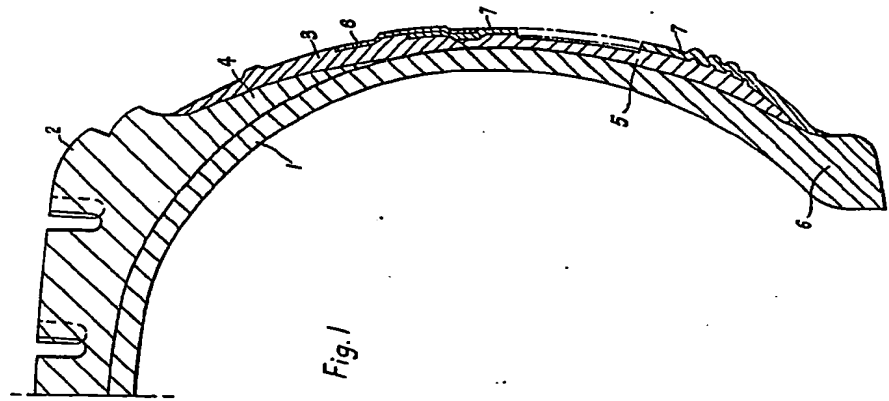
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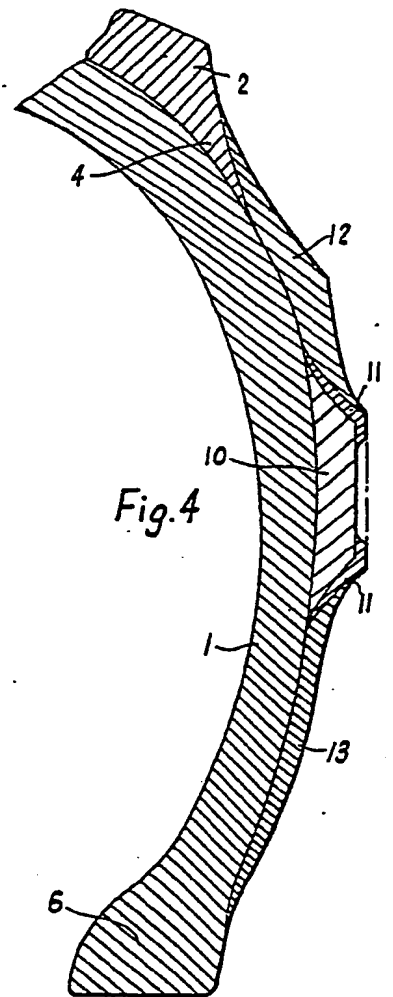
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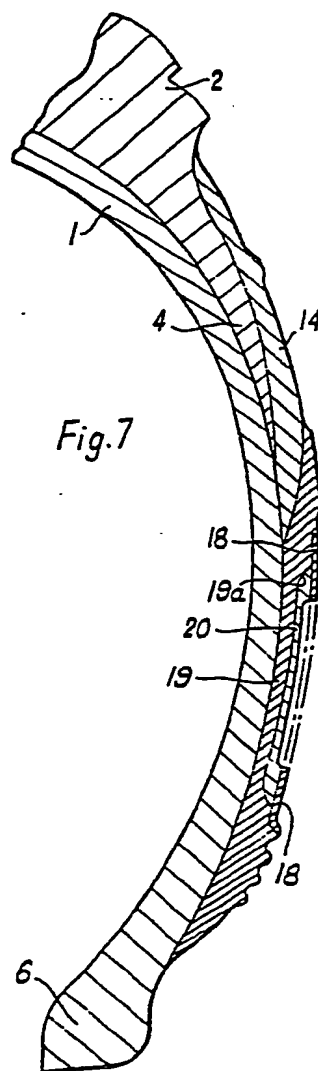
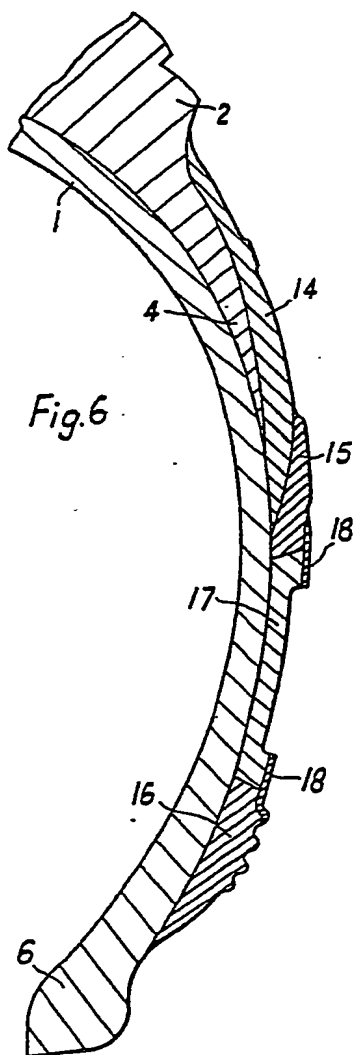
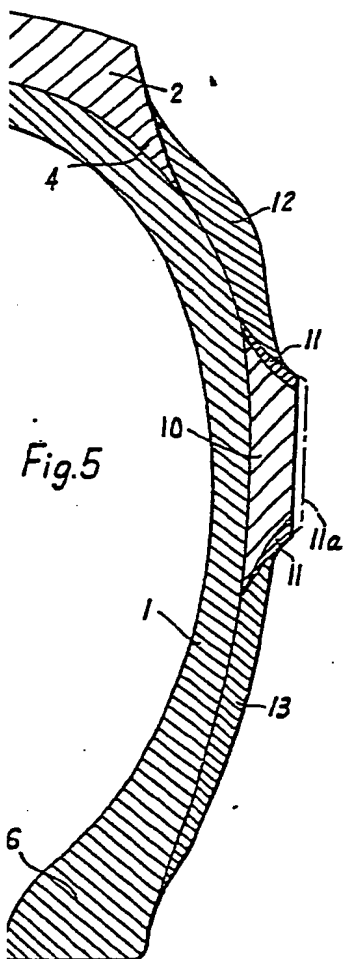
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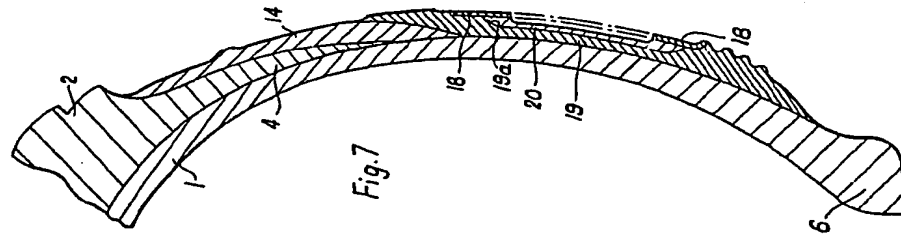


Fig. 7

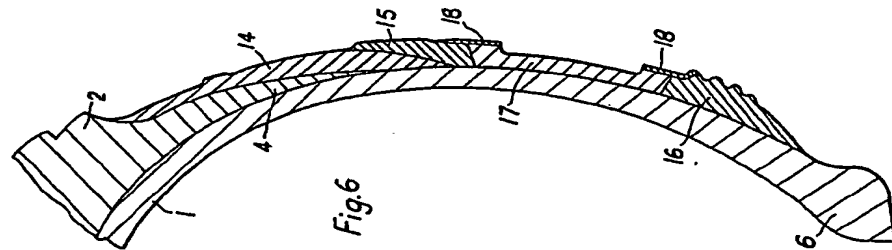


Fig. 6

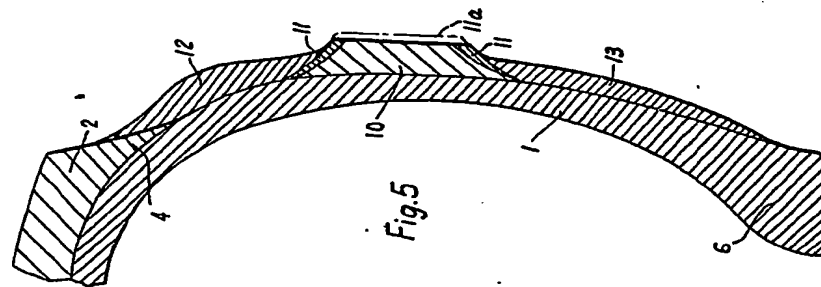


Fig. 5

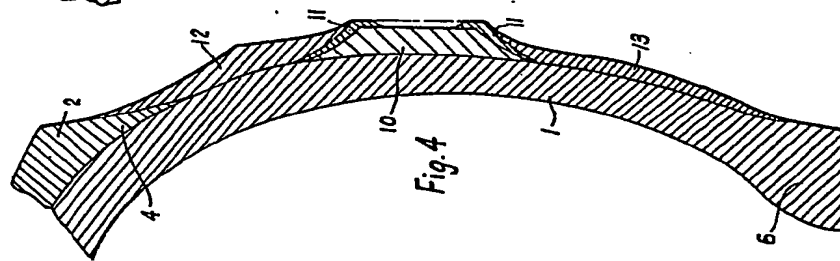


Fig. 4

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